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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,994	09/05/2001	Mitsuaki Echigo	388-011500	7881

7590 11/16/2004
Russell D. Orkin
700 Koppers Building
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Pittsburgh, PA 15219-1818

EXAMINER

NGUYEN, NGOC YEN M

ART UNIT PAPER NUMBER

1754

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/914,994

Applicant(s)

ECHIGO ET AL.

Examiner

Ngoc-Yen M. Nguyen

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-15, 17-33, 35 and 36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-15, 17-33, 35-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/2004 has been entered.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 12-15, 17-33, 35-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point out support, by page and line numbers, in the instant specification, for the limitation "approximately 30% or lower" as required in the instant claims. It should be noted that on page 8, lines 17, the range of "30% or lower" is disclosed, however, there is disclosure for "approximately".

Art Unit: 1754

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12-14, 21, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama (6,290,913).

Aoyama '913 discloses an apparatus for reducing the concentration of carbon monoxide included in a carbon monoxide-containing hydrogen-rich gas and also to a method of the same (note column 1, lines 7-10). As shown in Figure 22, the fuel-system 10G has a methanization unit 95 arranged down the CO selective oxidizing unit 34. The methanization unit 94 is filled with alumina pellets having a methanization catalyst, for example, a ruthenium catalyst, supported thereon. In the fuel-cells system 10G, the reformed gas discharged from the CO selective oxidizing unit 34 is subjected to the methanization reaction of carbon monoxide in the methanization unit 94, before being supplied as the gaseous fuel to the fuel cells 20 (note column 32, lines 22-34). Aoyama '913 further discloses that another possible structure may carry out the methanization reaction of carbon monoxide simultaneously with the selective oxidation reaction of carbon monoxide. Figure 26 shows structure of CO selective oxidizing unit 34H which is filled with alumina pellets having a CO selective oxidizing catalyst, for example, the platinum catalyst, supported thereon as well as the alumina pellets having the methanization catalyst, for example, the ruthenium catalyst, supported thereon (note

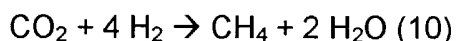
Art Unit: 1754

column 35, lines 4-19). Aoyama '913 teaches that one catalyst, such as ruthenium catalyst, has both the activities for selective oxidation of carbon monoxide and methanization of carbon monoxide can be used (note column 36, lines 27-54).

Aoyama '913 teaches that oxidizing gas containing oxygen is introduced into the selective oxidation reaction unit for oxidizing carbon monoxide (note column 4, lines 26-36). Even though Aoyama '913 does not specifically disclose the amount of oxidizing gas used, however, it would have been obvious to one skilled in the art to optimize this limitation to obtain the best result without having problem with the reverse shift reaction (note the discussion of the reverse shift reaction in column 3, lines 22-51).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the process of Aoyama '913 to remove CO from any hydrogen-rich gas such as gaseous fuel through the reforming reaction of a hydrocarbon as mentioned in column 1, lines 51-64.

Aoyama '913 further discloses that in the actual methanization unit, the methanization reaction of carbon dioxide expressed by Equation (10) proceeds, in addition to the methanization reaction of carbon monoxide:



The activity for the methanization of carbon dioxide also increases with a rise in temperature of the catalyst. These methanization reactions consume hydrogen in the reformed gas simultaneously with production of methane. In order to prevent a decrease in hydrogen partial pressure of the gaseous fuel lead to the fuel cells, it is desirable to set the temperature of the methanization catalyst as low as possible in a

Art Unit: 1754

specific range that enables sufficient methanization of carbon monoxide (note column 33, lines 10-31). This fairly suggests that carbon dioxide is present in the hydrogen-rich gas and the methanization of carbon dioxide is not preferred. It would have been obvious to one of ordinary skill in the art to optimize the condition in the methanization step in Aoyama '913 to avoid the methanization of carbon dioxide.

The difference is Aoyama '913 does not disclose that the methanization unit can be put before the selective oxidation reaction unit.

As stated above, Aoyama '913 fairly teaches that the methanization and the oxidation of the carbon monoxide can be carried out simultaneously, i.e., one reaction does not interfere with the other reaction. The reason why Aoyama '913 prefers to carry out the selective oxidation reaction first before the methanization reaction is because in the methanization reaction, hydrogen is consumed (note column 36, lines 16-21).

Thus, when one of ordinary skill in the art is not concerned about the hydrogen lost in the hydrogen-rich gas, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to carry out the methanization reaction first before the selective oxidation reaction in the process as disclosed in Aoyama '913 because as stated above, these reactions can be independently carried out.

Applicant's arguments filed October 22, 2004 have been fully considered but they are not persuasive.

The art rejection for the process claims over Aoyama '913 is withdrawn in view of the amendments to the claims and the declaration filed 8/23/2004 which shows that

Art Unit: 1754


when the CO is first removed by methanization method to reduce the CO amount to 30% or less of the original amount and then the remaining CO is removed by oxidation, less hydrogen is being consumed.

The rejection over the apparatus claims, however, is maintained because, the unexpected results as shown in the declaration are pertaining to the process, not the apparatus. Applicants have not pointed out any structure or element of the apparatus or system which would contribute to the unexpected results.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


Ngoc-Yen M. Nguyen
Primary Examiner
Art Unit 1754

Nmn
September 28, 2003